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AUTHOR Klinzing, Hans G.; Floden, Robert E.
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ABSTRACT

This paper discusses several interrelated processes aimed at helping teachers to use an experimental approach to improve their teaching. In making a diagnosis, the teacher generates a hypothesis about the relationship between his/her potential behavior and its effect upon the students. Following the formulation of such a hypothesis, the teacher observes the student responses to his/her behavior. These observations are interpreted in terms of the purposes that motivated his/her behavior in the first place. To practice teaching as experimentation, teachers need interrelated, overlapping categories of knowledge and abilities: (1) background knowledge; (2) abilities to use concepts to guide analysis and actions; (3) capacity for generating hypotheses; and (4) ability to carry out actions suggested by the hypotheses and to learn from the results. A discussion is presented on the role and content of these interrelated abilities and the methods that have been developed to help teachers acquire them. It is pointed out that developing these abilities enables a teacher to use class discussion as an effective teaching tool. (JD)

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LEARNING TO MODERATE DISCUSSIONS

Hans G. Klinzing
Universität Tübingen and Universität Stuttgart
(FRG)

and

Robert E. Floden
Michigan State University
(USA)

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LEARNING TO MODERATE DISCUSSIONS

Hans G. Klinzing
Universität Tübingen,
Universität Stuttgart, FRG

and

Robert E. Floden
Michigan State University
USA

Discussion in classrooms is widely recommended in textbooks as valuable in its own right and as a teaching method appropriate for achieving a variety of ambitious educational aims and related goals, especially in combination with other teaching modes. Among other things, this method can help pupils learn skills important for democratic participation in society, complex cognitive abilities (e.g., critical thinking, problem solving), affective outcomes (e.g., attitudes, moral development), and communication ability (e.g., Bridges, 1979; Gage & Berliner, 1984; McKeachie, 1986). This mode of instruction is considered most appropriate in "low consensus fields" (Gage & Berliner, 1984, p. 488), which are more common in social sciences and humanities than in other subject matters.

Research indicates that class discussions are surprisingly effective for attaining these lofty goals. Numerous studies included in research reviews (e.g., Costin, 1972; Gall, 1987; Gall & Gall, 1976; Kulik & Kulik, 1979) attest to the effectiveness of discussion for improving retention of information, higher level thinking and problem solving, attitudes and motivation, moral development, and communication skills.

In practice, however, little use is made of class discussions and those that do occur are often aimless and boring. Some teachers and students feel uncomfortable or even threatened in class discussions (e.g., Gall & Gall, 1976).

The difficulty of using this method may explain the scarcity of good instructional discussions. In comparison with other

instructional methods, discussions are highly complex and difficult to moderate, because students play a greater role in determining instructional content and organization, with resultant variability and uncertainty of classroom process (Floden & Clark, 1988). Fruitful class discussions require the teacher to have, not only highly skilled leadership, but also high degrees of emotional self-control, patience, frustration tolerance, intellectual versatility, readiness for mutual understanding, and willingness to give up authority. These traits in turn require a strong foundation in the rationale for instructional discussions, in the functions of moderator and participants, and in related discussion techniques. These dispositions, knowledge, and skills are not easy to acquire and teachers seldom have good models to emulate or good initial experiences as discussion moderators. The frustration teachers experienced while they were students or beginning teachers may thus discourage them from using this teaching mode (see Dillon, 1984) or from trying to master it.

To learn an instructional method with such inherent difficulties, teacher education must be especially potent. When learning other methods, teachers can reflect carefully on their experiences as students to supplement their teacher education. Thoughtful planning can help them maintain a reasonable standard of performance while they are gaining experience in interacting with students. Teachers probably have few memories of good discussion moderators, however. Moreover, the unpredictability and openness of discussions limits the reliance that can be placed on planning. Hence teacher education itself takes on a more important role in learning to moderate discussions.

This paper is organized around the idea that teachers should use inquiry into their own practice as a way to refine or improve their pedagogy. By carrying out controlled experiments in their own classrooms, teachers can use concepts derived from research or validated by their own experiences as the basis for the

process of self improvement. Thoughtful experimentation can help to prepare skillful and reflective practitioners--an objective endorsed by prominent educators from Dewey (1904) to Berliner (1985).

This paper discusses several interrelated processes aimed at helping teachers make use of this experimental approach. The processes are all well established in the literature. Each process can make an important contribution to teacher preparation, within the area to which it is addressed. In our presentation, we attempt to show how the processes can be brought together in a comprehensive program of teacher education.

Previous discussions of these processes consider the contributions each makes to important aspects of teaching. But the literature has not included discussions of how these potentially complementary contributions might be integrated. Such an integrated approach may strengthen the education of teachers for a challenging technique such as the discussion method.

In the search for ways to improve teacher education, teacher educators should set an example for all teachers by drawing on research to formulate promising hypotheses about their practice -- the practice of teacher education. Although the particular situations of individual programs will require adaptations, teacher educators should take advantage of the collective, systematically examined experience recorded in research reports. These reports are one important source of promising hypotheses about how programs should be designed to help teachers improve their ability to moderate instructional discussions. Reflective teacher education, for example, not only has been repeatedly recommended in past decades, but also has in part been studied and refined on the basis of research. Teacher educators should build new developments on that existing research (1).

Teaching as Experimentation

The characterization of teaching as experimentation --or more generally, interacting as experimentation-- is described well by Strasser (1967):

> In making a diagnosis, the teacher generates a hypothesis about the relationship between his potential behavior and its effect upon the students. In effect he is saying, "I ..., then the learners will. . ."
>
> Following the formulation of such a hypothesis, the teacher experiments: he behaves and observes the responses largely as a consequence of his behavior. These observations are then interpreted in terms of the purposes that motivated his behavior in the first place. . . . Viewed this way, instruction is experimental in nature. (Strasser, 1967, p. 180)

Not only has teaching often been conceptualized as experimentation (Coladarci, 1959; Shavelson, 1976), but experimentation has also been used as a framework for training teachers (Bishop, 1972; Klinzing, 1982; Semmel & Englert, 1978; Zifreund, 1966). The perspective of teaching as continuous experimentation assumes that improvement of practice and understanding of the nature, function, and worth of practices will occur simultaneously as a mutually inspiring, interactive process. In other words, this paper reflects the belief that improvement of theoretical understanding, practical knowledge, and performance happens as an interaction between, on the one hand, extensive acquisition of knowledge, skills, and techniques and, on the other hand, focused, reflected experience.

What does seeing teaching as experimentation suggest about how teachers can learn to moderate successful discussions? First, it suggests that teachers need to be able to come up with

hypotheses that are both appropriate to the particular ongoing discussion and grounded in the best available knowledge. General knowledge about the purposes of discussions, about the salient concepts for describing the participants, the moderator, and their actions, and about the general links among the actors, actions, and situations are all important for grounding the hypotheses. To ensure that the hypotheses are appropriate to the particular situation, teachers need an ability to analyze events in their ongoing discussion, using the relevant concepts to simplify and organize their understanding. This ability includes both recognizing individual instances of the concepts and using these concepts as tools to provide an overall analysis of the situation.

Once promising hypotheses are generated, teachers need to be able to carry out skillfully the actions needed to test them. This means having the skills required to act in ways that fit with the general relationships undergirding the hypotheses.

Finally, teachers need to be able to learn from such a test. Learning from the test of an hypothesis involves assessing whether the teacher has carried out the actions appropriately, reflecting on and evaluating the consequences of that action, and using that reflection as one basis for the next cycle of hypothesis and test.

Thus, to practice teaching as experimentation, teachers need the following interrelated, overlapping categories of knowledge and abilities:

Background knowledge establishes an overall framework of purposes, concepts, and their interrelationships. This framework guides reflection on possible hypotheses and provides the substantive basis for determining whether a given hypothesis is promising for improving the discussion. This knowledge should encorporate the best evidence available about which concepts are

important to moderating discussions and about which sorts of teacher or participant actions are most likely to lead to which consequences, under which circumstances.

Ability to use concepts to guide analysis and consequent action provides a means for productively simplifying the fluid pattern of activities and characteristics that make up an ongoing discussion. By acquiring the concepts associated with strategies and tactics for moderating discussions, teachers learn to see the classroom in ways that may lead to promising hypotheses and consequent productive action. The concepts can be used in making valid and reliable diagnoses of a given situation, as a guide for decisions about promising lines of action, as well as for the evaluation of those actions and their effects.

Capacity for generating hypotheses draws on the preceeding knowledge and skill in formulating possibilities for action that seem most likely to help the teacher effectively promote the aims and instructional goals of a particular discussion with a particular group of students.

Ability to carry out skillfully the actions suggested by that hypothesis and to learn from the results. Acquiring this ability includes acquiring and refining skills, learning how to use them appropriately, and learning how to use these experiments in practice to modify knowledge and skills.

The first two abilities are primarily cognitive; the last combines cognitive processes with action. The capacity for generating hypotheses bridges thought and action. Hypotheses come primarily from knowledge and analysis of the instructional situation, and can then be thought through and tested in action.

In the following sections, we will discuss (1) the role and content of these interrelated and overlapping abilities and (2)

the methods that have been developed and studied to help teachers acquire these abilities. For each of the methods, we will indicate its primary intention and the place it may have in teaching as experimentation.

Background Knowledge

From the perspective of teaching as experimentation, background knowledge provides a general framework for planning, interpreting, and evaluating classroom events. Such knowledge encompasses ideas about the purposes of instruction, its general orientation, and the general relationships among the various components and events of teaching and learning. For discussion, it would thus include an understanding of the primary purposes of discussion (especially in contrast with other instruction methods), recommendations for designing and moderating a discussion, and an understanding of research about the effects of this mode of instruction. This knowledge is related to the "why" and "what" of the discussion method (e.g., as presented at this symposium). For example, the knowledge might include knowledge about definitions and the nature of discussion (see Bridges, 1979; Dillon (Ed.), 1988; Gall & Gall, 1976), features that distinguish discussion from other teaching methods (e.g., recitation, inductive questioning) and from other discussion modes (e.g., debate or conversation, see Bridges, 1979), the different kinds of discussion and their inherent aims and possible goals (Gall, 1987; Gall & Gall, 1976), and research about the effectiveness of discussion for different kinds of goals (Gall, 1987; Gall & Gall, 1976). This focused background knowledge might be supplemented with an understanding of more general theories from social science and philosophy, such as theories of group dynamics or motivation.

From this focused and general theoretical knowledge, teachers can draw concrete conceptions of the significant features of

discussions and their interrelations. Especially important are general if-then relationships that are supported by research. Even though these relationships are not likely to hold in all contexts, they provide a good starting point --a basis for promising hypotheses.

Conceptual structures from background knowledge may guide teachers in the analysis of, interpretation of, and reflection upon their thoughts and actions and those of their students. The primary role of such structures is to provide a framework for thinking about the parts of a discussion and the relationship among those parts. This framework also gives information about the general direction of discussion and points out where and when the discussion method might be appropriate. Knowing the purpose of a discussion, for example, provides a way of understanding why a discussion moderator is trying to shape the discussion in a particular direction.

While providing this general framework is the primary role that background knowledge plays in learning to moderate discussions, it also provides a framework for other roles, such as using concepts to guide analysis and consequent action, generating hypotheses, or skillfully carrying out the actions suggested by those hypotheses.

In this paper, we emphasize the acquisition of research knowledge that is closely tied to pedagogy and especially to concepts and skills related to discussion. We recognize that teachers also need a sophisticated and deep understanding of the topics being discussed, but a discussion of what subject matter knowledge is necessary and how it might be acquired is beyond the scope of this paper. Likewise, abstract, context-independent knowledge (e.g., from basic social or philosophical research) may also, over time, have a considerable indirect impact on educational practice or may guide general educational reflection. Space

limitations, however, preclude consideration of teachers' general education.

Methods for Acquiring Background Knowledge

The primary methods for acquiring background knowledge about discussion are traditional instructional methods of reading and listening. This knowledge may be drawn from research reports, essays, and teachers' own reflective reports of their experience. It may address various aspects, including the roles, tasks, desired (and undesired) actions of both the discussion moderator and the other participants. Discussion itself may also be used to deepen understanding of the knowledge being acquired. Because these methods are familiar, we will not dwell on them here.

Results of Research

Although little empirical research has been done on the contributions of general background knowledge to the ability to understand and use concepts as organizational tools or the ability to generate hypotheses, there is a strong logical connection between learning background knowledge and acquisition of these other necessary capacities.

Research indicates that the acquisition of background knowledge alone may not directly improve practice: knowledge, insights, even attitudes which are acquired through reading or formal coursework do not generally lead directly to appropriate related performance, hence do not lead directly to improved student outcomes. Several studies indicate that teachers behave differently from their intentions and insights. Other studies have investigated the relationships among the amount of traditional teacher preparation, teachers' knowledge, and teachers' general attitude. These studies found weak or inconsistent results (e.g., Aspy, 1972; Cohen, 1973; Evertson,

Brophy, & Crawford, 1975; Rosenshine, 1971; Tausch & Tausch, 1977). Traditional forms of teacher education (lecture, book learning, discussions) must be more effectively linked to classroom practice if they are to influence that practice.

Ability to Understand and Use Concepts as Organizing Tools

Background knowledge is important for learning to moderate a discussion, but teachers also need to be able to use concepts as organizational, analytical, and guiding tools when they are engaged in (or observing) a discussion. In particular, they must learn to recognize the key instructional and interactional patterns in discussions and to analyze discussions in terms of these patterns or concepts. Once they can recognize these patterns, they can see how the immediate situation in a discussion group fits with their background knowledge and thus generate promising hypotheses about what to do next.

For discussion, it is important for teachers to use a variety of concepts related to moderating a discussion. The full range of concepts is described in various other papers presented at this symposium. For the present paper, it should be sufficient to consider some of the prominent categories under which the concepts fall:

- organizational structuring and administrative support (e.g., providing a suitable time, place, physical arrangement for the discussion, choosing the goals and rules that will govern the discussion, determining the composition of discussion groups, encouraging and systematically distributing participation, promoting interaction among the participants);

- structuring and guiding (e.g., making the structure of the discussion transparent to the participants, keeping the discussion focused);

- soliciting (e.g., initiating and keeping the discussion going by posing questions or making provocative statements);

- enhancing the quality of a discussion (e.g., moving the discussion toward general principles by providing a general synthesis or seeking relationships, pushing participants to consider difficult specific situations by posing questions about applications, reasons, or evidence).

Methods for Learning to Understand and Use Concepts as Analytical Tools

Three methods of acquiring and learning to use pedagogical concepts are well-established in teacher education: model demonstration, protocol materials, and training in observation instruments. These three methods are in many ways similar, though the first was originally based more on a behavioral learning theory; the latter two more on cognitive theory. All three methods have been the objects of numerous research studies. We sketch the three methods, then summarize what research has found about the conditions under which they seem to be effective for teacher education.

Model demonstration. The demonstration of desired teaching behavior has long been an integral part of teacher education. In the 1960s, filmed or videotaped demonstrations of particular teaching behaviors were systematically used as an integral part of teacher training programs, especially of teaching laboratories. The theoretical rationale for the use of such models in teacher education came from the early work of Bandura

(Bandura & Walters, 1963) and his theory of "observational learning." Models used to demonstrate desired teacher behaviors are live, taped, or written demonstrations of particular skills of teaching to be changed, constructed either as staged representations of specific skills or as carefully selected original, authentic records of examples from classrooms. In either case, the models provide short but clear examples of the skills to be learned, with cues (e.g., instructions, inserts, or supervisor) directing teachers' attention to important features of the skills.

Because research on modeling in the context of teacher education was often seen as the application of a behavior modification technique to teacher education (e.g., McDonald, 1973), researchers studying the method have virtually always investigated its effects on behavioral changes or examined which models (and supplements) are most successful in achieving this objective in a given context.

Protocol materials. Protocol materials resemble model demonstrations, but their initial rationale took a cognitive, rather than behavioral, orientation. B.O. Smith and his colleagues first discussed the use of protocol materials in teacher education (Smith, Cohen, & Perl, 1969) and made their development and use prominent in the US.

Protocol materials are short (5-15 minute) audio, film, video, or written records of classroom events or episodes, which portray concepts of educational significance. These records of classroom processes are supplemented and supported by written materials which provide introduction, definition, rationale, and review of research related to these concepts.

Usually, a set of protocol materials are provided to give an opportunity for repeated practice in identifying and interpreting classroom events. Protocols can be structured so that the

actions exemplifying the concepts to be learned are isolated and categorized through the use of such devices as brief multiple examples, "instant" replay of examples, narration, or subtitles. Documentary materials may be used to serve as less structured protocols, with similar effects on concept acquisition (Gliessman & Pugh, 1977).

By the mid-1970s, approximately 140 protocol materials had been developed (Cooper, 1975) and were available from the National Resource Dissemination Center at the University of South Florida. Many of these protocol materials are useful for the acquisition of concepts in the framework of classroom discussion. Gliessman and Pugh (1987), for example, describe materials for concepts such as probing questions and higher cognitive questions.

Training in observation instruments. Systematic analysis of classroom processes --in the teacher's own classroom or the classrooms of colleagues-- is also component in almost every teacher education program. Since the 1960s, when the focus of research on teaching shifted from teacher characteristics to systematically analyzed classroom processes, a vast number of studies have been conducted using low-inference observation instruments. Since then, teacher educators have been able to use the observational tools and techniques of classroom research to systematically help teachers and prospective teachers develop skill in classroom analysis.

Teachers have usually been trained in the use of classroom observation instruments by having them study the categories of the instrument (through readings, lectures, audio-visual aides, and perhaps discussions), then training them to identify or classify various types of actions and interactions from films, videotapes, or transcripts. Teachers, then, sometimes code and analyze videotapes of their own practice.

Training in the use of observation instruments is primarily intended to enhance teachers' diagnostic ability and their awareness of and sensitivity to classroom processes. By learning a system for analysis, especially a system that derived from research, it is intended that teachers gain an ability to analyse and diagnose instructional settings (even while they are teaching), an ability that may transfer to occasions when they are not using the instrument per se. Learning an observation system to the extent that it can be reliably used to observe classroom situations requires learning to identify and use the underlying concepts. In comparison with model demonstrations and protocol materials, learning to use an observation instrument often addresses a wider range of concepts and places greater emphasis on analysis, rather than concept acquisition. Nevertheless, existing observation instruments do use a constrained set of concepts for their analysis.

By learning to use observation instruments, teachers can also gain some of the other knowledge and abilities they need to moderate discussions. Observation instruments can, for example, provide focused feedback, which is important in developing the ability to carry out the actions called for by promising hypotheses. Used as a feedback source, observation instruments can help teachers compare what they intended to do with how they actually acted (Bandura, 1986).

The observation instruments to be used in training for moderating discussions should be chosen according to their fertility in answering significant questions related to the general goals of this teaching method. Fortunately, sourcebooks of observation instruments are available in which a wide variety of instruments --many of them appropriate for classroom discussions-- and the procedures for their use are described (Simon & Boyer, 1974) and psychometric characteristics (e.g., reliabilities, norms, indications of validity) are given (Borich & Madden, 1977). To enhance sensitivity to a wide range of factors important for

discussion, teachers should learn to use more than one observation instrument --each of which will focus on a small set of factors. They should also apply the instruments to a variety of discussions, so that they will be able to learn how the concepts apply in different contexts. (For examples of multiple analyses, see Dillon, 1988.)

Wilen (1988) provides, among other things, a useful review of observation systems that address concepts related to moderating discussions. That review provides a good starting point for those wishing to obtain and use such systems.

Training in observation methods need not be restricted to the low-inference systems used in teacher-effectiveness research. Training in high-inference systems can give teachers a quick, systematic way of assessing whether skills are being used in ways appropriate to the particular situation.

Qualitative researchers (e.g., Erickson, 1986) and teacher educators (e.g., Zeichner, 1987) have recently advocated training teachers in qualitative research methods (e.g., in classroom ethnography). The rationale for such training is similar to that already discussed --learning these methods can help teachers to become more sensitive to and reflective about the processes of a discussion. In particular, advocates of such training attempt to help teachers gain perspective on the everyday events in practice, especially highlighting relationships with the broader social, political, and cultural context (e.g., Zeichner, 1987).

Results of Research

Research on protocol materials and model demonstrations clearly indicates that these tools are powerful devices to help teachers learn to identify important features of instructional settings. Nine studies on protocol materials and three on model demonstrations found that trainees valued this training

experience positively. Moreover, fifteen studies found significant and consistent increases in their ability to identify instances of the target concepts. These studies are (with the exception of Gliessman & Pugh, 1977; Gliessman, Pugh, Brown, & Archer & Snyder, 1989; Johnson, 1968; Koran, 1971) reviewed by either Cruickshank and Haefele (1987), Cruickshank and Metcalf (1990), Gliessman and Pugh (1987), or Copeland (1982).

These methods were originally intended to go beyond simple identification of features, to give teachers the ability to use the concepts in their practice as cognitive tools to analyze and deal with classroom situations. The research, however, has never directly addressed effects on such general capacity for analysis and appropriate action (Klinzing & Tisher, in press).

Some evidence is available from studies of the effects of these teacher education methods on the frequency with which related actions are used. These effects on action are not as clear as those on simple identification of features, at least for protocol materials. In most of about 25 studies on the effectiveness of model demonstrations as a means of skill instruction, positive findings were obtained for particular, simple teaching skills, mostly assessed in simplified situations (reviewed in either Griffiths, 1976 or Turney, Clift, Dunkin, & Traill, 1973). The results of studies on protocol materials are not as consistent as those for model demonstrations. (See studies reviewed by Cruickshank and Haefele, 1987 or Gliessman and Pugh, 1987, plus the studies of Thornell and Lamb, 1978; Gliessman et al., 1989; Verloop, 1989). Five additional studies found it necessary to supplement protocol materials with opportunities of practice and thereby achieved changes in teachers' behavior (see review by Cruickshank and Haefele, 1987, and the studies of Ascione and Borg, 1980; Borg, 1977).

Several general principles for effective use of these materials can be drawn from the research literature. It is advisable

(especially for instructional patterns that are not highly conspicuous) to direct attention to the particular teaching techniques and patterns to be recognized. Visual or auditory cues might be given at the relevant point, or instructions might be given, or an observation instrument might be used. (Nine out of ten studies support this assumption; studies are reviewed either by Griffiths, 1976 or Turney et al., 1973.) Positive examples or a mix of positive and negative examples seem to be preferable to purely negative examples. (Four studies --reviewed by Griffiths, 1976-- support this claim, as does the additional study by Gilmore, 1977.) Visual materials (perceptual modeling) should generally be used for training in nonverbal behavior, though the expense of visual materials may not justify preferring them over instructions or transcripts (symbolic modeling) for verbal behavior. The research evidence does not clearly support a preference for perceptual over symbolic modeling for learning verbal behaviors. (Seven studies support the use of perceptual models; another six do not. Ten of these studies are reviewed by Griffiths, 1976 and Turney et al., 1973; the three additional studies are Gall, Dunning, Banks, & Galassi, 1972, Klinzing-Eurich & Klinzing, 1981, and Verloop, 1989.)

In contrast to the research on model demonstrations and protocol materials, research on training teachers to use observation instruments has focused in part on whether teachers can be trained to make reliable observations primarily on the effects of such training on teaching behavior.

Research on the reliability of teachers' observations is relevant to their analytical ability, because low reliability would make productive analysis difficult. Research results on reliability are encouraging. A variety of studies have shown that, for categorization of teacher and student talk, teachers can attain 60-70% reliability with six to ten hours of systematic training (16 studies reviewed in Peck & Tucker, 1973 or Klinzing, 1982, plus one additional study: Brusling, 1974). The review by

Klinzing and Tisher (1986) concludes that acceptable levels of accuracy can also be expected for teachers' observation of non-verbal behavior.

The few studies available suggest that training in the use of an observation instrument does enhance sensitivity to interactional processes in general (not merely increasing reliability on the instrument used in training), especially when teachers frequently use the instruments to analyse their own practice and that of their colleagues (Klinzing, Leuteritz, Schiefer, & Steiger, 1986; Klinzing, 1988).

Although effects on teachers' ability to carry out actions related to the analyses is not the primary intent of this training, research does suggest that training in the use of observation instruments can influence what teachers do, provided that this training is done in conjunction with other training procedures, like actively using the observation system as a feedback source (supported by five studies included in the reviews cited below). The effects of such training are expecially marked when it is combined with simplified practice. Training in observation systems by itself has shown inconsistent effects on what teachers do. (Nineteen studies report significant effects; sixteen no or virtually no effects. Studies are reviewed in: Cruickshank & Metcalf, 1990; Dunkin & Biddle, 1974; Flanders, 1970; Hanke, 1980; Klinzing, 1982; McLeod, 1987; Peck & Tucker, 1973; or Wragg, 1987.)

Research on the effects of training in ethnographic techniques has not yet been published. Teacher educators may wish to conduct their own investigations of the benefits of such training for teachers.

In summary, research suggests that a program to improve skills for moderating a discussion should include one or more of these methods for learning to understand and use concepts as analytic

tools. Model demonstrations, protocol materials, and training in the use of observation instruments lead to an increased ability to correctly identify instances of important pedagogical concepts and plausibly to higher diagnostic ability. They also may --when used in conjunction with other forms of teacher education-- influence teachers' actions.

Capacity for Generating Hypotheses

The core of teaching as experimentation is the generation and testing of hypotheses, hypotheses about the consequences different lines of teacher action will have for the individual pupils as well as for the overall course of a discussion. Experimentation is required of the teacher because the specific characteristics of the instructional situation (including students, school, and topics) will affect the general patterns of action and response. Some classes may, for example, respond positively to moderators' attempts to lift the level of discussion; others may respond with awkward silence.

An hypothesis is the bridge between, on the one hand, knowledge about discussion and skill in recognizing and analyzing key components of a situation, and, on the other hand, the course of action pursued. The cognitive knowledge and skill provides a research basis for stating a promising hypothesis to be tested; skill in action provides the concrete material for testing the hypothesis. On the basis of the test, changes may be made in either the knowledge (e.g., a belief about discussion may be modified) or in the action (e.g., the action must be done more skillfully or a different approach may be taken to lift the discussion).

Because of its position linking thought and action, each of the teacher education methods discussed so far contributes to enhancing the capacity to generate promising hypotheses.

Increased knowledge and analytical skill provides a broader, better informed substantive basis for hypotheses. The more clearly teachers can see the key features of an ongoing discussion, the more they know about the relations among those features, and the better they understand the purposes for their discussion, the better prepared will they be to identify promising possibilities for action.

Likewise, as teachers increase their skill in carrying out the actions indicated by the hypotheses, they are able to get feedback that helps in reshaping the hypothesis itself, rather than merely indicating that they were awkward or otherwise faulty in carrying out the intended action. When teachers are able to carry out intended actions skillfully, they are in a strong position to assess the merits of what they intended to do, and hence to abandon or refine their hypothesis.

The literature on teacher education contains little advice on methods primarily intended to strengthen the capacity for generating hypotheses (2). Until such recommendations are forthcoming, teacher educators must rely on the contributions of methods intended to improve other areas of knowledge, skill, and ability. Studies of teacher education programs provide indirect evidence that the combination of acquiring background knowledge, learning to use concepts, and practice with feedback (see below) enables teachers to generate promising hypotheses. Otherwise, their classroom practice would be ill adapted to the particular circumstances they face.

Ability to Carry Out Actions Skillfully

Background knowledge, concepts used as analytical and guiding tools, and promising hypotheses will do little to help teachers moderate instructional discussions unless they have the ability to carry through the actions that seem indicated and to carry

them through with the skill needed to make them match the teachers' intentions. The knowledge and abilities discussed so far are important preconditions, but are not enough in themselves. Skill in both thought and action are necessary for teaching as experimentation. Either alone can bring only well-considered fumbling or thoughtless action.

The particular skills to be learned can be considered under the same general categories as the concepts used to organize and analyze discussions: organizational structuring and adminstrative support, structuring and guiding, soliciting, and enhancing the quality of a discussion. Thus, for example, teachers need to learn skills involved in: physically arranging the room for a discussion (an example of organizational structuring and administrative support), making the structure of the discussion transparent to the participants (structuring and guiding), initially presenting an issue in a way that gets the group engaged (soliciting), and providing an interim synthesis that lifts the discussion to a higher level (enhancing the quality of the discussion). More detail on the range of specific skills is provided in other papers presented at this symposium.

Methods for Acquiring and Improving Skills in Action

Each of the teacher education methods previously discussed provides a necessary but partial basis for skill in classroom action, but, as the research indicates, none of the methods alone is likely to lead to the desired changes in actual classroom practice. The knowledge and skills gained by these methods may be necessary prerequisites for the development of skill in the performance of abilities by experimentation, but improvement in performance also requires some form of practice and an opportunity to learn from that practice. To make best use of teaching as experimentation, the settings for practice should --at least initially-- be constrained so that teachers can

introduce controlled, planned variations and obtain focused feedback on their effects.

Controlled practice with properly used information from feedback can help (from the perspective of social learning theory, Bandura, 1986) to acquire and refine skills, as well as to learn to coordinate them and use them in the appropriate circumstances. Simplified settings permit greater control and ease the exercise of skills, but require teachers to make greater leaps to transfer their skills to their own classrooms. A plausible approach is to begin practice of new, little used skills, or complex skills in simplified and highly controlled training situations to achieve skill acquisition and refinement, then move to more realistic situations to improve coordination with other skills and to learn to use it appropriately.

Whatever the simplicity of the setting, provision of specific, informative feedback and time for analysis and reflection are both necessary if the practice is to provide occasions for teachers to test the hypotheses they have generated. Teachers need feedback from an outside source because their own perceptions while teaching are biased, incomplete, and quickly forgotten. Several studies indicate that they cannot accurately report on their own behavior (Evertson et al., 1975; Hook & Rosenshine, 1979). Feedback may come from a variety of sources --audio or videotape recordings, pupils, observation instruments, colleagues, or supervisors.

Several different forms of controlled practice have been developed and studied. They vary primarily in the realism of the practice setting, from simulations to simplified teaching settings to practice in ordinary classrooms. We draw examples from two general categories of controlled practice settings --simulations and simplified practice. The latter are more realistic than the former. After illustrations of both

categories, we summarize what researchers have learned about effects on teachers' practical skill.

Simulations. Developments in teaching simulations were imported from military training, business, and management education in the 1960s and grew rapidly in the 1970s (Megarry, 1981). Most often simulations aimed at the improvement of broad skills and decisions, like acquisition of principles and problem solving skills (Copeland, 1982), but sometimes also aimed at acquisition and appropriate use of skills needed to moderate discussions.

Generally, simulations in teacher education confront trainees with problem situations (displayed, for example, in written materials, film clips, or computer displays), ask them to act out a response, then simulate the resulting consequences or provide feedback. (For a variety of examples, see Copeland, 1982; cruickshank & Metcalf, 1990.)

We describe here one easily implemented program that is well suited to helping teachers improve the way they moderate discussions. In the 1960s, Tausch and Tausch (1977) developed a simulation intended to help educators improve their social-integrative behaviors and attitudes. The participants, organized in small groups, were asked to write detailed descriptions of critical educational situations they had experienced. The group members then wrote or role-played how they would have reacted as teachers to some of these critical situations. These reactions are discussed in the small groups as well as in the whole group. Such exercises were often combined with components like presentation of theory, model demonstrations, or analysis of instructional situations.

A variation on this method is the Simulated Social Skill Training (SSST) described by Flanders (1970). In the SSST, the members of small (3-5) groups rotate in the roles of teacher, "foil" (student), and observer. The observers code the behaviors or

keep other kinds of records for later evaluation. The difficulty of the teacher's task can be increased by privately instructing the foils or by restricting the teacher's role (Flanders, 1970, p.249ff).

Simplified practice. In the 1960s programs were developed that included a component of simplified, controlled practice (with feedback). These kinds of programs became well known as "microteaching" (Allen & Ryan, 1969), "minicourses" (Borg, Kelley, Langer, & Gall, 1970), or "teaching laboratories" (Berliner, 1985; Klinzing, 1982) and became an established teacher education procedure in many colleges and universities around the world. We use the phrase, "simplified practice," to refer to all programs in which teachers practice in a controlled, simplified setting with feedback.

The original intent of simplified practice was to develop immediate proficiency in particular skills (Allen & Ryan, 1969). A later shift to a cognitive perspective cast these settings as prime opportunities for teaching as experimentation (Klinzing, 1982). Repeated practice under controlled, safe conditions was seen as a necessary condition, not only for skill acquisition, but for experimentation that would enhance understanding and improve reflection-based decision making.

Simplified practice has taken several different forms, from teaching 5-10 minute lessons with 3-6 pupils focusing on one skill or a set of interrelated skills (e.g., Allen & Ryan, 1969) to teaching entire lessons to entire classes to practice a range of different skills. In each form, the teaching would be followed by feedback and might go through multiple cycles of teaching, feedback, and reteaching.

The provision of feedback is essential if teacher are to learn from practice. Without feedback it is difficult for teachers to know whether their hypotheses can be accepted or must be

modified, and whether what they have done matched with what they had intended to do. The feedback can take many forms, ranging from seeing or hearing recordings of the lesson to having pupils, peers, or supervisors give their reactions.

Performance feedback can be combined with feedback focusing on cognition and affect. Teachers may, for example, be asked to recall their thought processes and feelings with the aid of a recording of their teaching. (See, e.g., Kagan, 1972.) With the help of colleagues or supervisors, the teacher can then reflect upon those mental processes and the factors that may have brought them about. Feedback --on performance or on mental processes-- is then used to develop, compare, contrast, weigh, and reflect alternatives and resulting behaviors for similar types of situations and to treat these alternatives as new hypotheses.

Research Results

Only a few studies have examined the benefits of simulations. Copeland (1982) and Cruickshank and Metcalf (1990) reviewed selected studies and found evidence suggesting that simulations are effective in teaching the application of principles of teaching, skill acquisition, problem solving skills, and attitude change. A number of studies have shown that simple simulations can increase teachers' social-integrative manner (important for discussion moderating) in reacting to simulated situations. Behavioral changes, however, could only be observed in performance tests using simplified situations, seldomly in entire classrooms. Studies on effects on teachers' attitudes or personality characteristics revealed inconsistent results (see Copeland, 1982; Klinzing & Klinzing-Eurich, 1988).

Hundreds of studies have examined the effects of simplified practice on teachers' skills. For skill acquisition, numerous studies confirm that programs that combine some form of practice (with feedback) with methods for acquiring background knowledge

and learning to use concepts increase trainees' ability to use skills. More than a hundred studies indicate that such programs are effective (and more effective than other methods usually employed in teacher education) in the acquisition of a large variety of skills (including discussion moderator skills), as measured by increased use of these skills (see, e.g., Borg et al., 1970; Klinzing, 1982; Klinzing & Klinzing-Eurich, 1988; Peck & Tucker, 1973; Sadker & Cooper, 1972). Joyce and Showers (1981) concluded from their comprehensive review that practice (with feedback) is especially important to achieve transfer of skills from the laboratory to classroom practice (especially if combined with "coaching").

Research has thus focused more on skill acquisition and refinement than on teachers' capacity to make reflection-based decisions about where and when it would be appropriate to use a particular skill. In a review of about 40 comparative studies, Klinzing, Klinzing-Eurich, and Floden (1989) found direct (though not entirely uniform) evidence that simplified practice contributes to skill acquisition (as assessed by low inference observation instruments). Gliessman (Gliessman, Pugh, Dowden, & Hutchins, 1988) found a similar --though much smaller-- effect in his comparison across selected studies of training in questioning skills.

Evidence of improved decision making is less direct. Positive training effects on global ratings of teaching quality suggest that teachers are able to apply their skills under the appropriate circumstances, but the training effects seem to be smaller than the studies employing low inference measures; moreover, not all studies show positive effects. The reviewers conclude that programs combining simplified practice (with feedback) with the methods discussed earlier will lead to both the acquisition of discussion moderator skills and their appropriate use. A similar conclusion is indicated by studies of the effects of teacher training on pupil behavior (Klinzing

et al., 1989). These general results have been substantiated in studies of programs that attempted to teach discussion moderating skills --higher cognitive questions, wait time, balancing volunteering and nonvolunteering pupils' responces, or redirection (e.g., Borg et al., 1970; Klinzing, 1982; Klinzing-Eurich & Klinzing, 1981, 1988).

Feedback is an essential component of both simplified and realistic practice in teacher education. Evidence from more than 300 studies in teacher education (as well as in other fields) indicates that provision of immediate, accurate, informative, and focused feedback motivates and facilitates change in teachers' thoughts and actions. Unfocused feedback (e.g., from audio or video recordings) may make teachers eager to change, but seldomly leads to behavioral changes. (See, e.g., Bierschenk, 1975; Fuller & Manning, 1973; Levis, 1987; Peck & Tucker, 1973.)

In most studies of the effectiveness of feedback, the focus has been on teachers' actions. Focusing feedback on the consequences of these actions ("impact feedback") has promise far exceeding the attention it has received (Fuller & Manning, 1973). The effects of "coaching" that employs feedback and assistance for appropriate transfer and implementation of skills (Joyce & Showers, 1981) has seldomly been studied systematically (see, e.g., Showers, 1983; 1985), but several studies of earlier and later versions of coaching show that the consultant services, intensive observations and feedback, and colleagial systems for training, evaluation, and feedback all lead to appropriate skill implementation (see Showers, 1983; 1985, the presage-process-product studies cited in Brophy & Good, 1986, and studies reviewed in Cruickshank & Metcalfe, 1990).

Few studies (some of them are reviewed in Dunkin, 1986; Fuller & Manning, 1973) have examined the effects of feedback on the cognitive and affective dimensions of effective teaching. Studies using stimulated recall to study effects of feedback on

teachers' decision-making show promise in terms of teachers' conceptual development and refinement (Dunkin, 1986), as well as improvement in teachers' decision making ability (e.g., Parker, 1983) but are still rare.

Self-directed Training for Moderating Discussions

Though the methods discussed in this paper have primarily been used in organized programs of teacher education, most of them can be used by individual teachers or groups of teachers who wish to enhance their capacity for moderating instructional discussions. Background knowledge can be gained by reading books or papers such as the papers presented at this symposium. Methods such as model demonstrations, protocol materials, and training in observation instruments can be used to enhance understanding, retention, and use of concepts on an individual basis. If ready-made materials are not available, teachers could use audio or video tapes of their own teaching situations, using the observation instruments discussed earlier as a focus. Teachers will likely profit more from concept acquisition and classroom analyses if they work with a group of colleagues.

Simplified practice should be arranged so that emphasis in the early stages of training (or when the behaviors to be learned are complex, multifacetted, or unusual) is placed on understanding the nature and functional value of the skills as well as on their acquisition. Feedback should at first focus on strengthening and refining specific skills or strategies, assessing their use by low inference observation instruments which show that the skill can be used "on call" and that its use matches the underlying concepts. Audio and video recordings can be used as tools for self-managed feedback, with observation instruments again serving as a focus.

Research indicates that practice with feedback can --if appropriately designed-- help to improve decision-making and reflection and thereby to improve teaching. Thus, later stages of skill development should move toward more realistic situations (half classes, stages of a lesson, whole class) and focus on decisions about how to select and combine skills to suit the particular instructional situation. Feedback (using audio and video recordings) should focus on decision-making, integration of the newly acquired behaviors into the flow of classroom discussion, and the effects of actions on students. When used as a focus, high inference measures can provide indications of teachers' ability to match their decisions and actions to the particular teaching situations.

To enhance decision-making ability and reflection, feedback should be provided by and discussed with another person or group of people. This discussion can include stimulated recall, eliciting and considering descriptions of decisions made and their bases. Hence this feedback may be helpful in improving generation of promising hypotheses and acting on the results of trials that test the hypotheses. All feedback should be related to the particular aims and values of the discussion method.

Provision of feedback, development of alternatives, and conferencing in training teams with rotated roles (actor, observer, consultant) is highly recommended, because experience in changing perspectives may enhance teachers' ability to analyze classroom processes and thus, among other things, to monitor their own teaching. (This recommendation is not yet supported by research, but is derived from experiences, observations, and reponses of trainees during training courses, Klinzing, 1982.)

Although also not based on research findings, <u>repeated</u> practice of particular skills or set of skills in conditions which are kept comparable from one session to the next or are varied intentionally (with informative feedback and assistence by other

persons) seems to be of high importance, not only for skill acqusition and understanding, but especially for improving decision-making ability and reflection.

Towards a Better Basis for Discussion Moderation

Teachers who have developed the knowledge, analytical ability, and skill needed to generate, behave according to, and test promising hypotheses about moderating discussions are in a good position to improve discussions that are part of their instruction. Teachers who work in groups to improve their discussions have an even better basis for self-improvement.

But a group of teachers experimenting with discussions in their classrooms can promote improvements beyond the classrooms they occupy. A group of teachers, working together to generate and test hypotheses, has the capacity to make significant additions to knowledge about discussion concepts and their relationships.

Though there is much research available on classroom discussion, it should be clear that educators have only begun to understand the skills discussion moderators use and their effects. We began this paper with the observation that good instructional discussions remain rare events in schools. In part this scarcity is due to difficulties inherent in the method. But it is also in part due to the lack of knowledge of the ways good discussion moderators have found to work under the variety of circumstances teachers face. Groups of experimenting teachers could begin to remedy this lack of knowledge.

By systematically varying the approaches that they take and recording the results of those approaches, a group of teachers can carry out comparative studies whose validity would compare favorably with the published studies cited at this syposium. Their studies could develop and compare methods of teacher

education as well as methods of moderating discussions. Moreover, by starting with promising hypotheses, such groups of teachers could carry out experiments that would confirm and extend general results of research in a variety of specific school and classroom contexts. While improving discussion moderator skills, teachers can then also be contributing to the knowledge base from which they are working.

Notes:

Note 1) In preparing this paper, we undertook a comprehensive review of all research on the teacher education processes we discuss. Space limitations prohibit a discussion of all these studies, or even listing all of them. We try, as much as possible, to cite reviews that encompass much of the relevant work, together with individual studies that were not included in previous reviews.

Note 2) Recently, teacher educators have developed an interest in the use of case studies. Although little research has yet been done on the effects resulting from the use of case studies, studies of the use of case studies, critical incidents, and simulations (e.g., Gliessman, Grillo, & Archer, 1989; see Cruickshank & Metcalfe, 1990) indicate the promise of these methods for helping teachers learn to generate hypotheses.

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